

7.2 Zero and Negative Exponents

A Review of Exponent Rules

Example 1. Write as a single power (simplify). Do not evaluate.

a) $10^3 \times 10^7 =$

b) $a^2 \times a \times a^3 =$

c) $5^{12} \div 5^7 =$

d) $x^4 \div x^3 =$

e) $(4^3)^5 =$

f) $(a^6)^2 =$

g) $a^2 \times (a^3)^2$

h) $(x^2)^4 \div (x^3)^2$

B Zero Exponent

Example 2. Use two different method to simplify $a^4 \div a^3$.

Conclusion:

$$a^0 = 1$$

if $a \neq 0$

Example 3. Write as a single power (simplify). Do not evaluate.

a) $10^0 \times 10^3 =$

b) $a^2 \times a^0 \times a^1 =$

c) $5^2 \div 5^0 =$

d) $(4^0)^5 =$

e) $(a^6)^0 =$

f) $(2 + 7 \times 3^5 - 4^2)^0 =$

Example 4. Evaluate.

a) $2^0 + 3^0 - 0^4 =$

b) $(1 + 4^0 - 0^4)^2 \div (1 + 3^0) =$

C Negative Exponent

Example 5. Use two different method to simplify $a^2 \div a^5$.

Conclusion: $a^{-n} = \frac{1}{a^n}$ if $a \neq 0$

Example 6. Write by using a positive exponent.

a) $10^{-2} =$

b) $a^{-3} =$

c) $5^{-1} =$

Example 7. Use the exponent rules to simplify. Write the answer by using a positive exponent.

a) $10^0 \times 10^{-4} =$

b) $a^2 \times a^{-5} \times a^0 =$

c) $5^2 \div 5^5 =$

d) $(4^{-2})^3 =$

e) $(a^{-3})^{-2} =$

Example 8. Evaluate.

a) $2^{-2} =$

b) $1^{-3} =$

c) $0^{-1} =$

d) $(-2)^{-3} =$

e) $\left(\frac{1}{2}\right)^{-2} =$

Example 9. Write as a power of 10.

a) one thousand

b) one thousandth

c) one billion

d) one billionth

Example 10. Convert into metres by using powers of 10.

a) one centimetre

b) one millimetre

c) one micron

Example 11. Write as a single power (simplify). (Challenge)

a) $5^{-3} \times \frac{5^6}{5^{-2}} =$

b) $3^{-5} \times (3^{-2})^{-4}$

c) $(7^{-4})^2 \div (7^3)^{-3}$

d) $\left(\left(\frac{1}{2^{-3}}\right)^{-2}\right)^{-1}$

Notes: Textbook Pages 364-367

Homework: Textbook Pages 368 # 2ab, 3ab, 8, 16ab, 17ab